

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1           1-10. (Canceled)

1           11. (Currently Amended) A self-pinned abutted junction magnetic read  
2 sensor, comprising:  
3           a free layer for sensing magnetic fluxuations;  
4           first hard bias layers abutting the free layer; and  
5           second hard bias layers, formed over the first hard bias layers ~~discontiguous~~  
6 discontiguous from the free layer, ~~the~~ a magnetization of the second hard bias layers  
7 being anti-parallel to ~~the~~ a magnetization of the first hard bias layers, the first and second  
8 hard bias layers providing a net longitudinal bias on the free layer.

1           12. (Original)     The sensor of claim 11, wherein the first hard bias layers is  
2 formed with a thickness substantially equal to a thickness of the second hard bias layers.

1           13. (Original)     The sensor of claim 11, wherein the first hard bias layers is  
2 formed with a thickness greater than a thickness of the second hard bias layers.

1           14. (Original)     The sensor of claim 11 further comprising interlayers  
2 disposed between the first and second hard bias layers.

1           15.    (Original)    The sensor of claim 11 further comprising a self-pinned  
2    layer, the self-pinned layer having a first end, a second end and central portion, wherein  
3    the central portion is aligned with the free layer and the first hard bias layers are formed  
4    over the first and second ends of the self-pinned layer.

1           16.    (Original)    The sensor of claim 15 further comprising a spacer layer  
2    formed over the self-pinned layer and a first and second seed layer formed between the  
3    first and second hard bias layer and the spacer layer.

1           17.    (Original)    The sensor of claim 16 further comprising amorphous  
2    layers formed between the spacer and the first and second seed layers, the amorphous  
3    layer stopping epitaxial growth between the self-pinned layer and the first and second  
4    hard bias layers.

1           18.    (Original)    The sensor of claim 15 further comprising amorphous  
2    layers formed between the self-pinned layer and the first and second hard bias layers for  
3    stopping epitaxial growth between the self-pinned layer and the first and second hard bias  
4    layers.

1           19.    (Original)    The sensor of claim 11 further comprising first and second  
2    leads formed over the first and second hard bias layers.

1           20.   (Original)    The sensor of claim 11, wherein the free layer further  
2   comprises a length selected for a desired track width.

1           21.   (Currently Amended) A magnetic storage system, comprising:  
2           a moveable magnetic storage medium for storing data thereon;  
3           an actuator positionable relative to the moveable magnetic storage medium; and  
4           a magnetoresistive sensor, coupled to the actuator, for reading data from the  
5   magnetic recording medium when position to a desired location by the actuator, wherein  
6   the magnetoresistive sensor further comprises:  
7                   a free layer for sensing magnetic fluxuations;  
8                   first hard bias layers abutting the free layer; and  
9                   second hard bias layers, formed over the first hard bias layers  
10   ~~discontiguous~~ discontiguous from the free layer, ~~the~~ a magnetization of the second hard  
11   bias layers being anti-parallel to ~~the~~ a magnetization of the first hard bias layers, the first  
12   and second hard bias layers providing a net longitudinal bias on the free layer.

1           22.   (Original)    The magnetic storage system of claim 21, wherein the first  
2   hard bias layers is formed with a thickness substantially equal to a thickness of the  
3   second hard bias layers.

1           23.   (Original)    The magnetic storage system of claim 21, wherein the first  
2   hard bias layers is formed with a thickness greater than a thickness of the second hard  
3   bias layers.

1           24.    (Original)    The magnetic storage system of claim 21 further  
2   comprising interlayers disposed between the first and second hard bias layers.

1           25.    (Original)    The magnetic storage system of claim 21 further  
2   comprising a self-pinned layer, the self-pinned layer having a first end, a second end and  
3   central portion, wherein the central portion is aligned with the free layer and the first hard  
4   bias layers are formed over the first and second ends of the self-pinned layer.

1           26.    (Original)    The magnetic storage system of claim 25 further  
2   comprising a spacer layer formed over the self-pinned layer and a first and second seed  
3   layer formed between the first and second hard bias layer and the spacer layer.

1           27.    (Original)    The magnetic storage system of claim 26 further  
2   comprising amorphous layers formed between the spacer and the first and second seed  
3   layers, the amorphous layer stopping epitaxial growth between the self-pinned layer and  
4   the first and second hard bias layers.

1           28.    (Original)    The magnetic storage system of claim 25 further  
2   comprising amorphous layers formed between the self-pinned layer and the first and  
3   second hard bias layers for stopping epitaxial growth between the self-pinned layer and  
4   the first and second hard bias layers.

1           29.    (Original)    The magnetic storage system of claim 21 further  
2   comprising first and second leads formed over the first and second hard bias layers.

1           30.    (Original)    The magnetic storage system of claim 21, wherein the free  
2   layer further comprises a length selected for a desired track width.

1           31.    (Currently Amended) A self-pinned abutted junction magnetic read  
2   sensor, comprising:  
3           first means for sensing magnetic fluxuations;  
4           first bias means abutting the first means on opposite sides of the first means; and  
5           second bias means, formed over the first bias means ~~discontiguous~~ discontiguous  
6   from the first means for sensing magnetic fluxuations, ~~the~~ a magnetization of the second  
7   bias means being anti-parallel to ~~the~~ a magnetization of the first bias means, the first and  
8   second bias means providing a net longitudinal bias on the first means for sensing  
9   magnetic fluxuations.

1           32.     (Currently Amended) A magnetic storage system, comprising:  
2           a moveable magnetic storage means for storing data thereon;  
3           an actuator positionable relative to the moveable magnetic storage medium; and  
4           a magnetoresistive sensor, coupled to the actuator, for reading data from the  
5 magnetic recording medium when position to a desired location by the actuator, wherein  
6 the magnetoresistive sensor further comprises:  
7                     first means for sensing magnetic fluxuations;  
8                     first bias means abutting the first means on opposite sides of the first  
9 means; and  
10                    second bias means, formed over the first bias means ~~discontiguous~~  
11 discontiguous from the first means for sensing magnetic fluxuations, ~~the~~ a magnetization  
12 of the second bias means being anti-parallel to ~~the~~ a magnetization of the first bias means,  
13 the first and second bias means providing a net longitudinal bias on the first means for  
14 sensing magnetic fluxuations.